BMP: TEMPORARY SLOPE DRAIN

Definition

A flexible tubing or conduit extending from the top to the bottom of a cut or fill slope.

Purpose

To temporarily conduct concentrated stormwater runoff safely down the face of a cut or fill slope without causing erosion on or below the slope.

Conditions Where Practice Applies

On cut or fill slopes where there is a potential for upslope flows to move over the face of the slope causing erosion and preventing adequate stabilization.

Planning Considerations

There is often a significant lag between the time a cut or fill slope is completed and the time a permanent drainage system can be installed. During this period, the slope is usually not stabilized and is particularly vulnerable to erosion. This situation also occurs on slope construction which is temporarily delayed before final grade is reached. Temporary slope drains can provide valuable protection of exposed slopes until permanent drainage structures can be installed or vegetation can be established.

Temporary slope drains can be used in conjunction with diversion dikes to convey runoff from the entire drainage area above a slope to the base of the slope without erosion. It is very important that these temporary structures be installed properly, since their failure will often result in severe gully erosion on the site and sedimentation below the slope. The entrance section must be securely entrenched, all connections must be watertight, and the conduit must be staked securely.

Design Criteria

Drainage Area-

The maximum allowable drainage area per slope drain is 2 hectares (5 acres).

Flexible Conduit-

The slope drain shall consist of heavy-duty, flexible material designed for this purpose. The diameter of the slope drain shall be equal over its entire length. Reinforced hold-down grommets shall be spaced at 3 meter (10-foot) or less intervals. Slope drains shall be sized as listed in Table 15-1.

TABLE 15-1
SIZE OF SLOPE DRAIN

Maximum Drainage Area		Pipe Diameters	
Hectares	Acres	millimeters	inches
0.2	0.5	305	12
0.6	1.5	457	18
1.0	2.5	533	21
1.4	3.5	610	24
2.0	5.0	762	30

Entrance Sections-

The entrance to the slope drain shall consist of a standard flared end-section for metal pipe culverts with appropriate inlet protection as set forth in CULVERT INLET PROTECTION, BMP-8. If ponding will cause a problem at the entrance and make such protection impractical, appropriate sediment removing measures shall be taken at the outlet of the pipe. Extension collars shall consist of 300 millimeter (12-inch) long corrugated metal pipe. Watertight fittings shall be provided (See Figure 15-1).

Note: End-sections made of heavy-duty, flexible material may be utilized if determined by the Plan-Approving Authority to provide a stable inlet or outlet section.

Dike Design-

An earthen dike shall be used to direct stormwater runoff into the temporary slope drain and shall be constructed as set forth in DIVERSION, BMP-12. See Figure 15-1 for placement of dike in relation to the slope drain.

The height of the dike at the centerline of the inlet shall be equal to the diameter of the pipe plus 150 millimeters (6 inches). Where the dike height is greater than 450 millimeters (18 inches) at the inlet, it shall be sloped at the rate of 3:1 or flatter to connect with the remainder of the dike (see Figure 15-1).

Outlet Protection-

The outlet of the slope drain must be protected from erosion as set forth in OUTLET PROTECTION, BMP-18.

Construction Specifications-

1. The measure shall be placed on undisturbed soil or well-compacted fill.

2. The entrance section shall slope toward the slope drain at the minimum rate of 42 millimeters per meter (0.5 inches per foot).

3. The soil around and under the entrance section shall be hand-tamped in 200 millimeter (8-inch) lifts to the top of the dike to prevent piping failure around the inlet.

4. The slope drain shall be securely staked to the slope at the grommets provided.

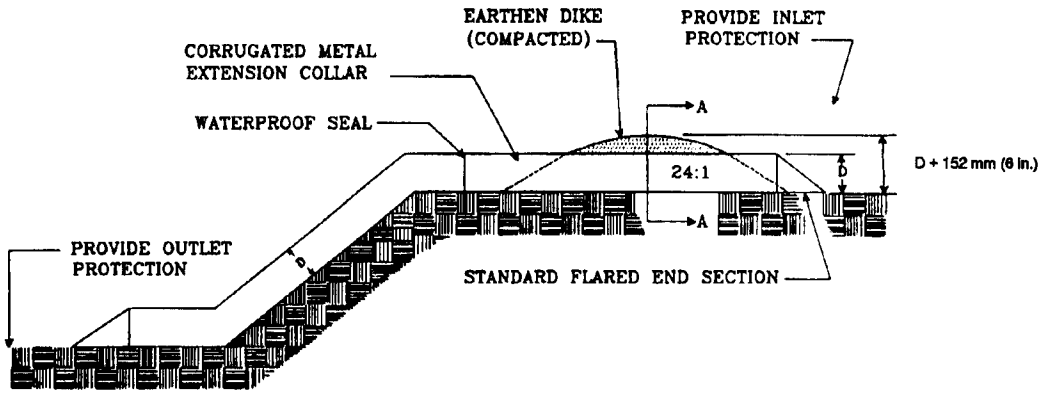
5. The slope drain sections shall be securely fastened together and have watertight fittings.

6. Install CULVERT INLET PROTECTION and OUTLET PROTECTION as per BMP-8 and BMP-18, respectively.

Maintenance

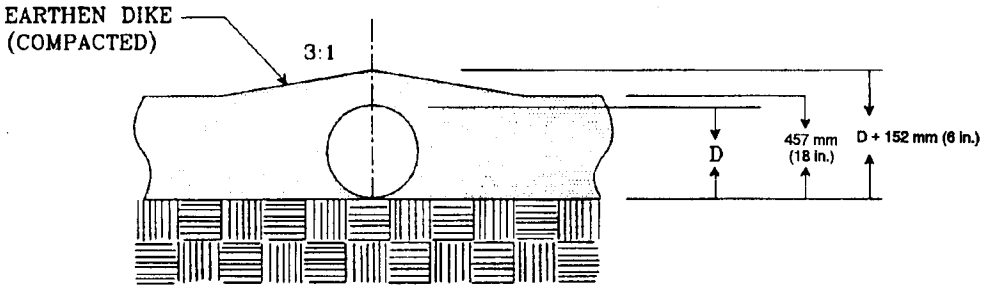
The slope drain structure shall be inspected weekly and after every storm, and repairs made if necessary. The contractor should avoid the placement of any material on and prevent construction traffic across the slope drain.

FIGURE 15-1: TEMPORARY SLOPE DRAIN



SECTION VIEW

NOTE: SEDIMENT MAY BE CONTROLLED AT OUTLET IF UPLAND PONDING WILL CREATE PROBLEMS



SECTION A – A